

## **ABSTRACT**

This invention provides heat transfer systems and methods of cooling surfaces and heating liquids which employ surfaces including a minimum density of discrete, nucleation sites having a conical cross-section tapering to a minimum predetermined depth. These surfaces are placed in contact with a refrigerant having a preselected boiling point so that the nucleation sites become largely flooded with the refrigerant. The nucleation sites permit nucleate boiling of a refrigerant without a temperature overshoot on the initial ascent. In more preferred variations of this invention, specific site spacing and geometries are employed to contain tiny bubble embryos, which minimize hysteresis and reversal of trend effects.

LIST OF REFERENCE NUMERALS

- 10 Chip  
11 Module  
12 Gold Film Contacts  
14 Back Surface Thermocouple Locations  
16 Insulated Copper Power Leads  
17 Voltage Taps  
18 T-Type Thermocouples  
20 Felt Insert  
22 Short Stainless Steel Tube  
23 Cryogenic Adhesive  
24 Fiberglass Insulation  
26 Felt Insert  
28 Cryogenic Adhesive  
30 Specimen  
32 RTV Silicon Adhesive/Sealant  
33 Power Leads  
34 Stainless Steel Sting  
36 Pass-Throughs  
37 Thermocouple Wires  
39 Voltage Taps  
42 Insulated Stainless Steel Tank  
44 Vertical Immersion Heater  
45 Bottom Plate  
46 Thermocouples